

focus on energy

renewable energy success story

Harvesting Iowa's New Crop: Waverly Light and Power Wind Energy

A new crop is growing in Iowa. You see it sprouting for miles along Interstate 35 near Clear Lake. You see a small patch outside Algona. At Alta, a huge field is in place. And if you live in Waverly, you've watched it grow and grow.

That new crop for Iowa is wind power. Wind farms in Clear Lake, Joice, Algona and Storm Lake are producing wind energy for Iowans. In Waverly, the place where it all began, wind energy is a growing power source for customers of Waverly Light and Power. In fact, with the addition of the "Skeets 4" wind turbine just outside the city in 2001, the residents and businesses of Waverly are now getting 5 percent of their power from wind and other renewable sources, according to Glenn Cannon, general manager.

Waverly Light and Power (WLP) began its search for wind energy in 1991. With the installation of an 80 kilowatt wind turbine in 1993, WLP became the first utility in Iowa, and the first municipal utility west of the Mississippi River, to own and operate a wind

At a Glance:

"Skeets 4"
900 kW Wind Turbine
Waverly Light and Power

Location: Waverly, Iowa

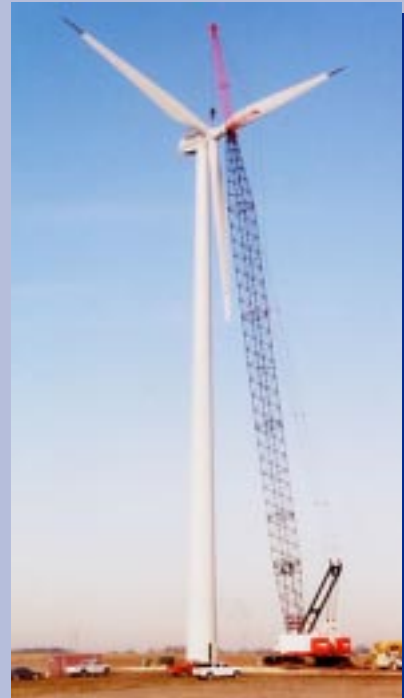
Annual Electricity Production:
2.2 million kWh

Carbon Dioxide Avoided:
2,330 tons/year

Annual Energy Provided:
261 homes

Type of Turbine:
NEG Micon NM52

Project Cost: \$1.1 million



facility. Named "Skeets 1" after Russell "Skeets" Walther, the farmer who offered his land for the project, the small turbine helped WLP learn about the integration of wind power into a utility system.

WLP's interest in wind energy was driven by several factors: 1) a desire to diversify its energy sources; 2) a motivation to explore environmentally friendly sources; and, most importantly, 3) a commitment to fulfilling its customers' needs and wants.

Planning discussions with a community advisory group and other customers had shown Cannon and the WLP staff that customers wanted the utility to look at all resource options in an integrated way. The first unanimous choice of the advisory group was wind power.

From the early experiment with the "Skeets 1" turbine, WLP decided in 1999 to invest in two turbines at the Storm Lake Wind Power Generation Facility, which contains 259 turbines.



Because WLP had a firm transmission contract to wheel electricity from northwest Iowa to Waverly, installing the turbines in a location with higher wind speeds than Waverly made sense.

Skeets 2 and 3, the two turbines in the Storm Lake wind farm, are 750 kW Zond Z-50 turbines. The graph below shows their

actual energy output in megawatt hours.

With the success of Skeets 1, 2, and 3, WLP decided to pursue further wind development. Several factors helped WLP decide to locate its next turbine at Waverly, despite it being only a Class 3 wind area (wind regimes are ranked as Class 1 to Class 7).

First, the development of new, larger turbines made harvesting wind in lower-wind speed regimes more feasible. In addition, transmission constraints made moving power from other parts of the state unlikely. It also was more economical to place the turbine on the distribution system of the utility rather than paying for transmission. WLP has begun to market "green tags" as a way to sell the environmental attributes of renewable energy without transmitting the actual electrons.

Finally, the visibility of a locally placed turbine was

invaluable to WLP customers' understanding and support of wind energy.

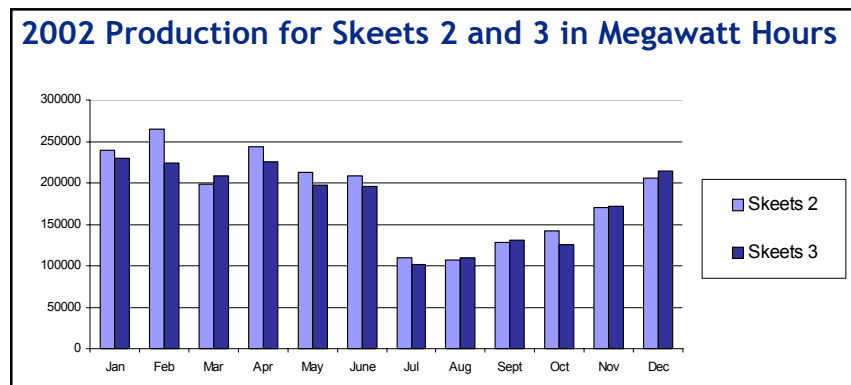
In evaluating the viability of a new 900 kW turbine to be located at Waverly, WLP examined the following factors:

♦ **Wind resource availability:** WLP installed a meteorological tower with an anemometer to measure wind speeds at the site. Additionally, wind speed monitoring from 1994 to 2000 indicated the site had adequate wind resources.

♦ **Economic viability:** The utility compared the cost of wind with new resource options, such as new coal or natural gas power plants, rather than to depreciated coal plants.

♦ **Technical feasibility:** A consultant conducted feasibility studies on new turbine technologies.

♦ **Neighbor relations:** WLP contacted area land and homeowners to discuss any concerns about a larger turbine being sited in their neighborhood.



WLP issued a Request for Proposals asking for a turn-key approach, including site work, the turbine and its installation, interconnection, and warranty costs. Bids were evaluated based on the resulting cost per kilowatt hour of electricity produced. NEG Micon provided the winning bid, with a

project cost of \$968,847.

The utility self-financed the project through a fund set aside for future generation facilities and through a bond issue.



Financial projections took into account a replacement tax exemption for utility-owned wind generation facilities.

Next, WLP applied for a Federal Aviation Authority permit, due to the height of the tower. That process took four months. The county did not require any permits since the turbine is located on agricultural land. Soil samples were taken in preparation for the concrete foundation. The turbine installer inspected the county roads to ensure they could handle the large equipment needed to transport the crane and turbine parts.

In December 2001, Skeets 1 was taken down and replaced

with Skeets 4, a 900 kW NEG Micon NM52 turbine. The installation process took about two weeks. Mobilization and transportation of a crane large enough to install the tower and rotor was the most difficult part of the process. Ten tractor trailers were needed to move the crane to the site.

"In general, we were impressed by how smoothly the installa-

tion process went, considering what a massive undertaking it is," said Cannon. "The installation created a stir in the area. Pickup trucks were lined up for a mile. I think 90 percent of the farmers in Bremer County came to watch the turbine get installed," he said.

Skeets 4's tower rises to an impressive 231 feet. With a diameter of 171 feet, the rotor sweeps over a 23,000 square foot area.

Going on-line on December 18, 2001, Skeets 4 produced more

electricity in its first 15 days than Skeets 1 produced in an average year. "In terms of the technology, Skeets 1 was like a 1948 Ford, and Skeets 4 is a 2002 Lexus," said Cannon.

The output of the Skeets 4 wind turbine goes right to Waverly Light and Power's distribution system. "Locating turbines on the distribution side is most advisable to avoid transmission issues completely," said Cannon.

Some of the other ongoing costs involved in WLP's wind project include land leases and operation and maintenance (O&M). WLP signed a 50-year land lease with the Walther's family valued at \$3,000 per year for the Skeets 4 turbine.

For O&M on all of its turbines, WLP contracts for \$7,500 per year with an energy maintenance company that provides regional services. The yearly cost includes supervision, insurance, monitoring costs, and routine and unscheduled maintenance.

According to Cannon, wind turbines require less maintenance than diesel generators, and much of it can be done remotely through fiber optics lines run to the turbines.

The table below shows the actual expenses and final-cost-



per- kWh generated for all of WLP's wind turbines for 2002, with projections for 2003. The table includes the Renewable Energy Production Incentive (REPI), a federal payment that subsidizes the cost of renewable power. REPI payments are provided annually based on actual production.

With all expenses, including

tal impacts. They avoid nearly 6,580 tons of carbon dioxide annually, a greenhouse gas associated with climate change. There have been no effects on avian species or bats.

Noise has not been a problem, either. The new 900 kW Skeets 4 turbine is actually quieter in its operation than the 80 kW Skeets 1. "Visitors are con-

stantly commenting on how quiet the new turbine is," said Cannon.

Becoming involved in wind energy has helped the community of Waverly invest in the future. Adding renewable energy resources to its portfolio has increased diversification, reliability, and cost-effectiveness. Add community pride to the equation, and it's a winning solution for Waverly.

WLP is now setting goals to increase its supply of wind and renewables to 10 percent of its electricity mix. From a small 80 kW turbine on Skeet Walthers farm, Waverly Light and Power has developed as a powerhouse of wind energy in Iowa and the Midwest.

Actual and Projected Costs for Skeets 2,3, and 4

	2002 (actual)	2003 (projected)
Net kWh generated	6,506,793	6,506,793
Expenses	\$183,658	\$186,613
Cost per kWh generated	\$0.0282	\$0.0287
REPI payment	\$0.0175	\$0.0180
Cost per kWh with REPI	\$0.0107	\$0.0107
<i>Add cost of money</i>		
Cost of money	\$26,455	\$26,455
Total with cost of money	\$210,113	\$213,067
Cost per kWh generated	\$0.0323	\$0.0327
Cost per kWh with REPI	\$0.0148	\$0.0147

depreciation, O&M, cost of money, and warranties, and with the REPI payment, WLP's cost of power from wind is expected to be approximately 1.47 cents/kilowatt hour, depending on the yearly output. Annual expenses are projected using an inflation factor for O&M.

Currently, the output of Skeets 2, 3, and 4 meets the electrical needs of 761 homes and supplies 5 percent of the annual energy provided by WLP. WLP's wind energy facilities cause no negative environmen-

A Tribute to Skeets

"One can be certain that Waverly Light and Power's next wind turbine will also be named "Skeets." Should your travels take you north of Waverly on the road V14, be sure to look to the east. There, you will catch a magnificent sight of Skeets' memorial, a 231-foot tall wind turbine, proudly standing as a reminder and tribute to Russell "Skeets" Walther."

- Waverly Light & Power Web site



**Norma and
Russell "Skeets"
Walther**

For more information on Waverly Light and Power's wind turbine installations, go to www.waverlyia.com/WLP or contact the Iowa Association of Municipal Utilities at (515) 289-1999.

